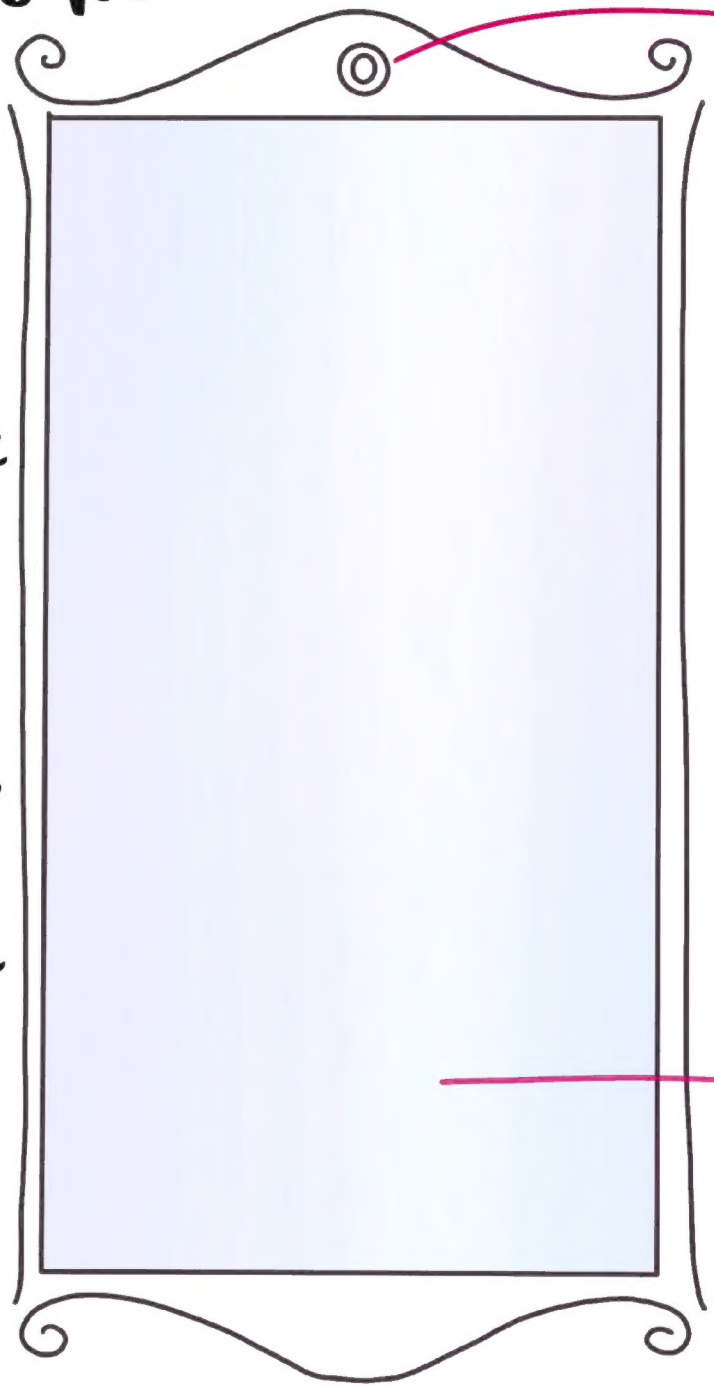
Truth
Reflect

How might we uncover and highlight the flaws and algorithmic biases in AI systems?

smart mirror

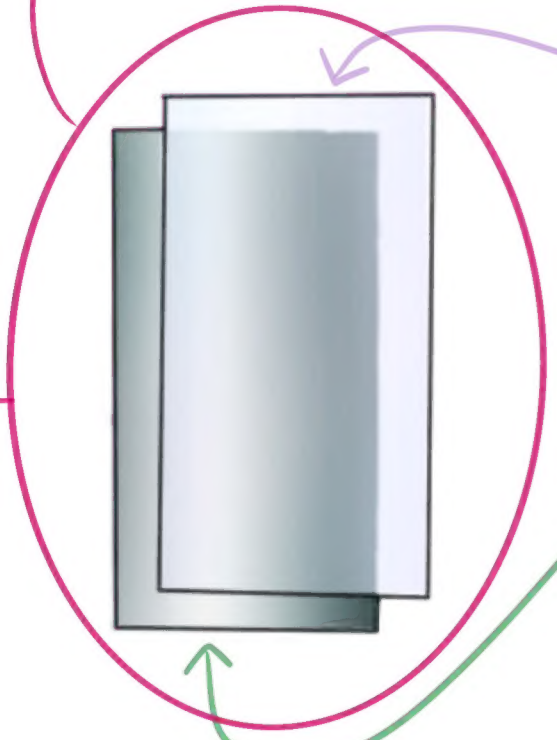
demonstrate flaws in AI facial recognition systems to users in real-time



facial recognition system/camera (raspberry pi)

software options

- Amazon Rekognition
- Microsoft Azure Face
- IBM Watson Visual Recognition
- Face ++



2 way mirror to lay over an LCD screen display

Possible Displays

① predictions/classifications by facial recognition system

Number of faces: 1

Gender: Male

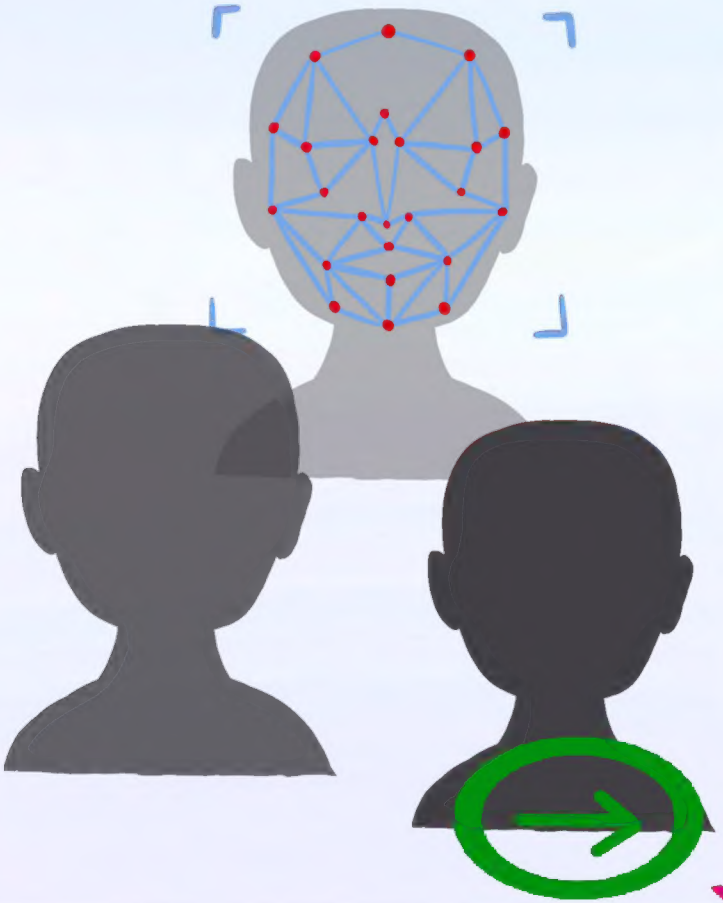
Age Range: 20 - 29

Ethnicity: Caucasian

Emotion: Happy

Tap on number(s) that are correct:

1 2 3 4 5



MIRROR

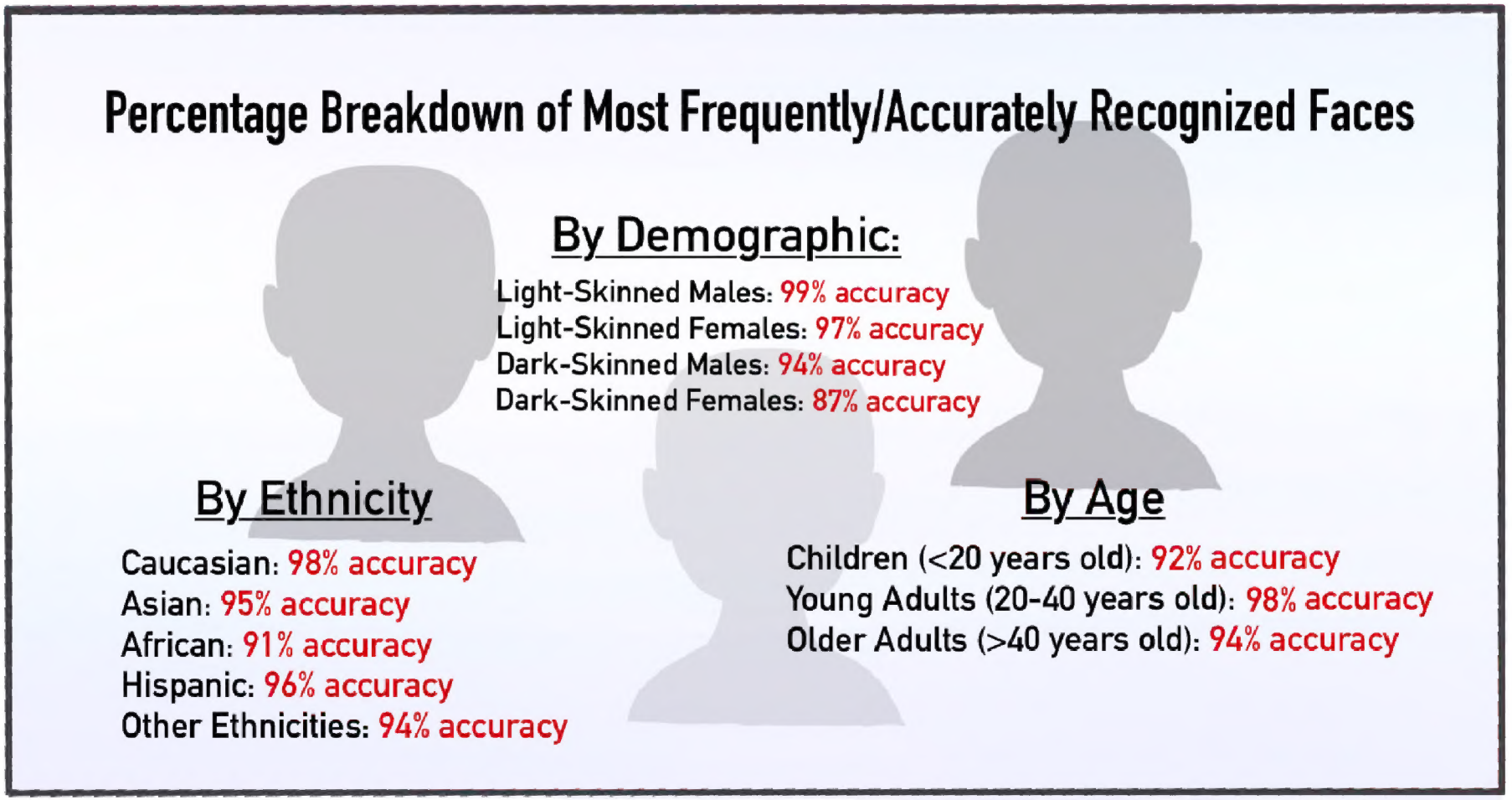
user-input · collect data to better examine accuracy / flaws of facial data

survey

user interaction to next page

Possible Displays Cont.

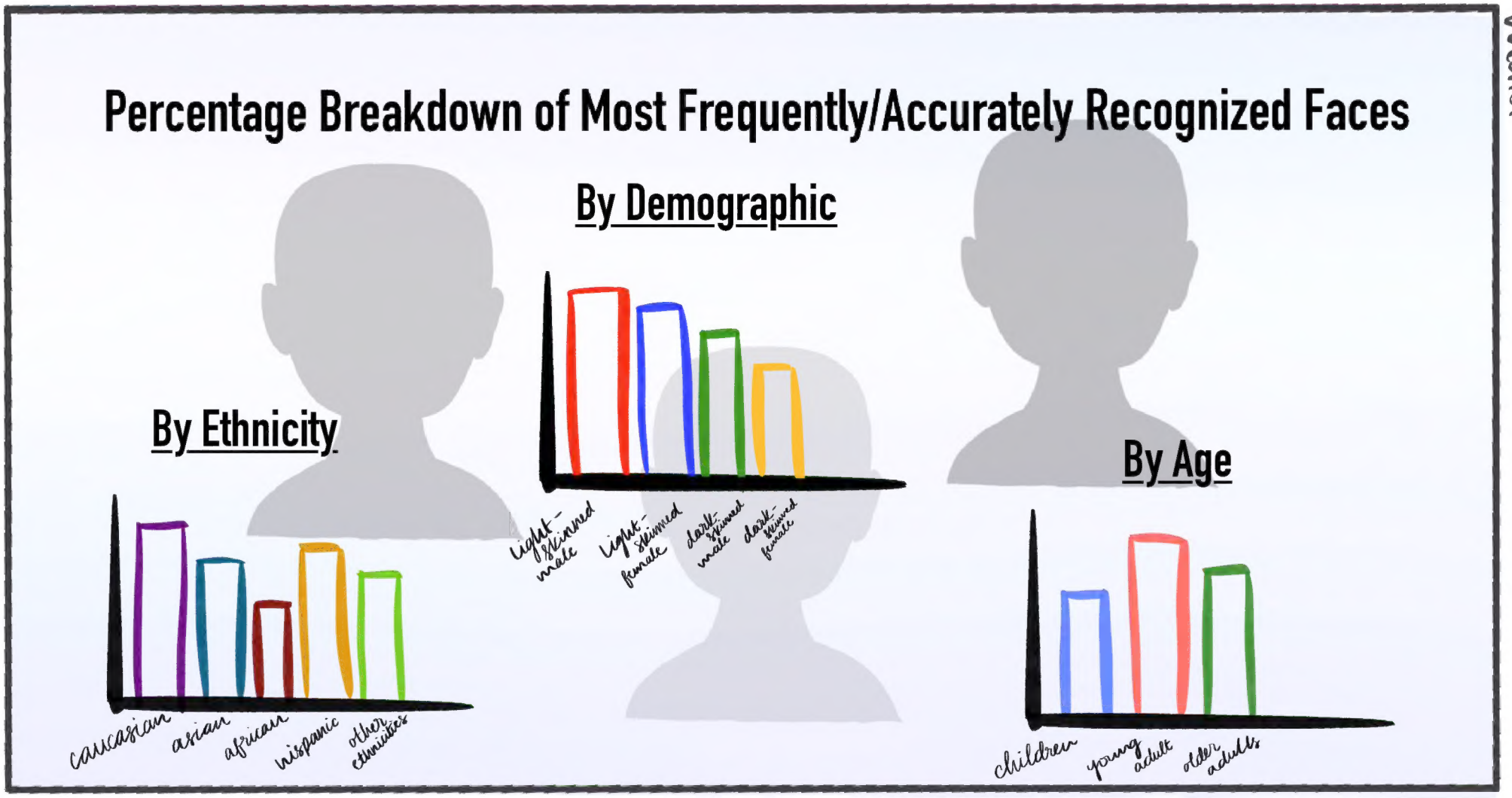
① Hypothetic results of facial data accuracy based on user-input survey from 1st screen



Mirror

Possible Displays Cont.

① alternative display of results (visual representation)



Possible Displays Cont.

② predictions/classifications by facial recognition system

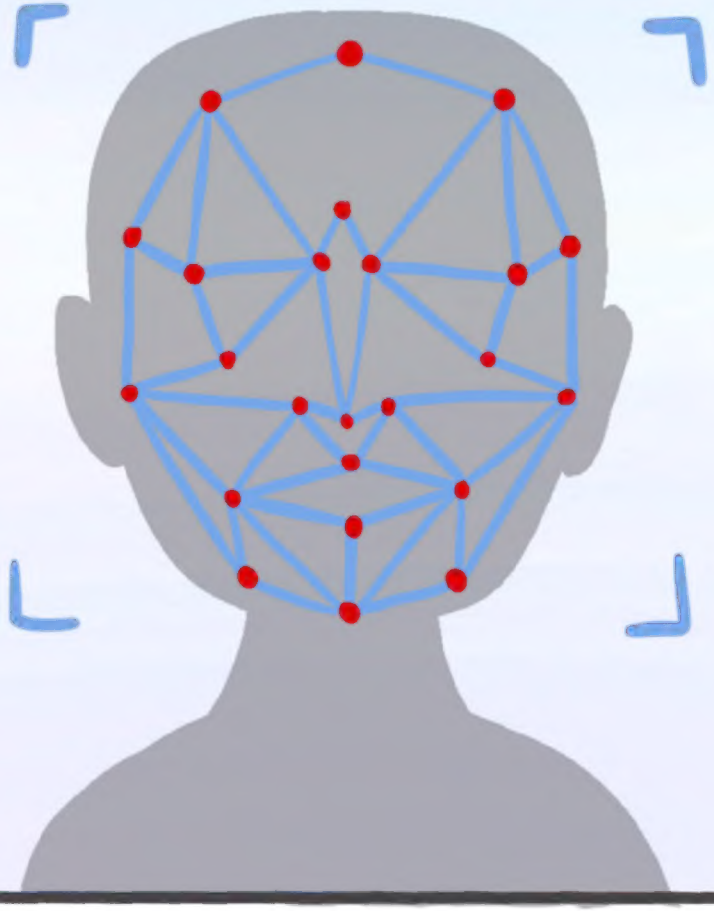
Gender: _____

Ethnicity: _____

Age Range: _____

AI Confidence Level:

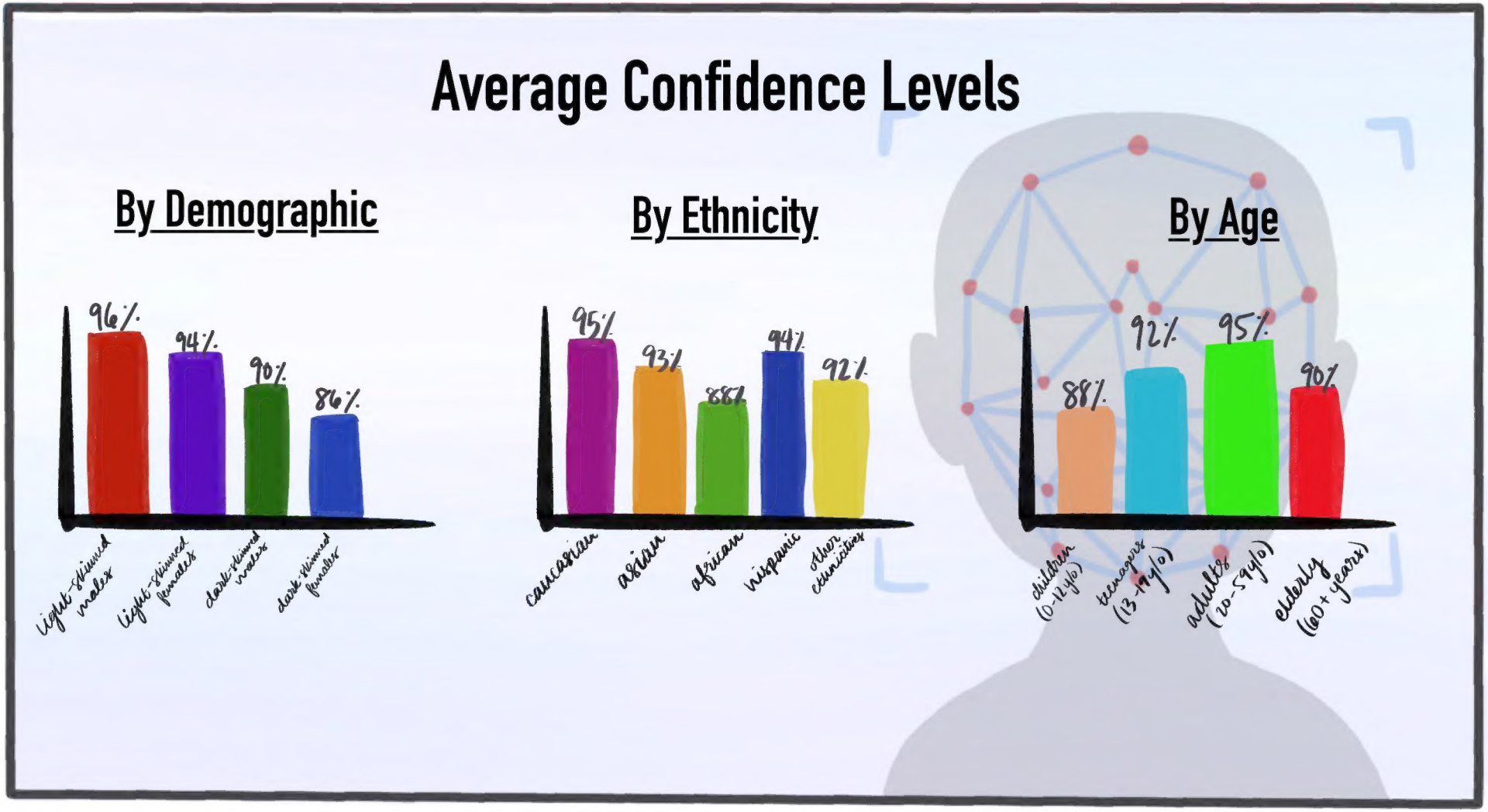
____%

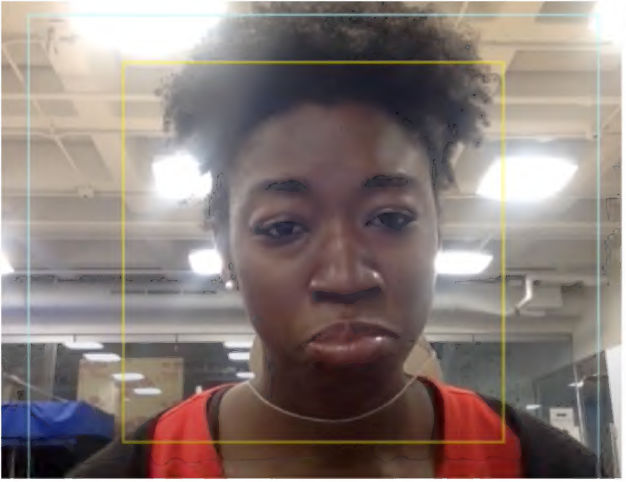


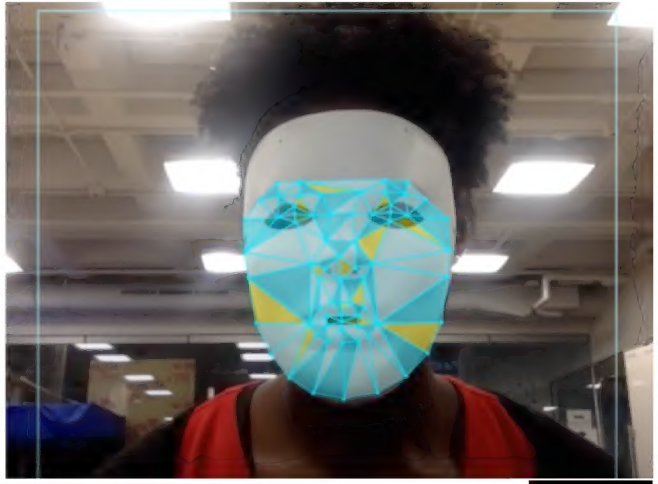
User interaction to next page

Possible Displays Cont.

② Hypothetic results comparing confidence levels for different demographics







To illustrate this, researcher Joy Buolamwini created a data set using 1,270 photos of parliamentarians from three African nations and three Nordic countries.

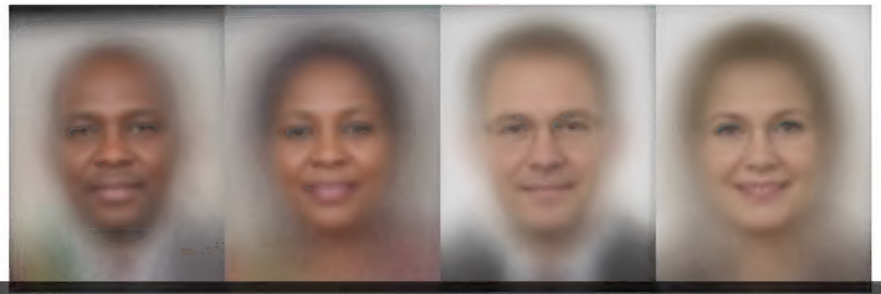
The faces were selected to represent a broad range of human skin tones, using a labeling system developed by dermatologists, called the Fitzpatrick scale.

The scale is viewed as more objective and precise than classifying based on race, **according** to the New York Times.

Buolamwini found that when the person in a photo was a white man, the facial recognition software worked 99% of the time.

But when the photo was of a darker skinned woman, there was a nearly 35% error rate.

Gender Classifier	Darker Male	Darker Female	Lighter Male	Lighter Female	Largest Gap
Microsoft	94.0%	79.2%	100%	98.3%	20.8%
FACE++	99.3%	65.5%	99.2%	94.0%	33.8%
IBM	88.0%	65.3%	99.7%	92.9%	34.4%



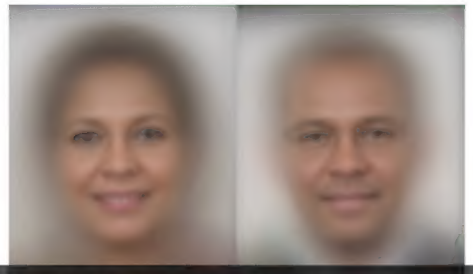
In a 2018 study titled Gender Shades, a team of researchers discovered that popular facial recognition services from Microsoft, IBM and Face++ can discriminate based on gender and race

Sources

Research shows that facial recognition technology is less accurate when seeking to identify darker-skinned faces.

A study, which measured how the technology worked on people of different races and gender, found three leading software systems correctly identified white men 99 per cent of the time, but the darker the skin, the more often the technology failed.

Gender Classifier	Female Subjects Accuracy	Male Subjects Accuracy	Error Rate Diff.
Microsoft	89.3%	97.4%	8.1%
FACE++	78.7%	99.3%	20.6%
IBM	79.7%	94.4%	14.7%



Previous research looked at how facial recognition worked between different genders and races. Pictured, the researchers found that Microsoft, IBM and Face++'s systems were more likely to accurately identify a photo of a man instead of a photo of a woman

POTENTIAL HARMS FROM ALGORITHMIC DESCISION-MAKING

INDIVIDUAL HARMS		COLLECTIVE SOCIAL HARMS
ILLEGAL DISCRIMINATION	UNFAIR PRACTICES	
HIRING		LOSS OF OPPORTUNITY
EMPLOYMENT		
INSURANCE & SOCIAL BENEFITS		
HOUSING		
EDUCATION		
CREDIT		ECONOMIC LOSS
DIFFERENTIAL PRICES OF GOODS		
LOSS OF LIBERTY		SOCIAL STIGMATIZATION
INCREASED SURVELLIANCE		
STEREOTYPE REINFORCEMENT		
DIGNATORY HARMS		

Chart Contents Courtesy of Megan Smith, Former CTO of the United States

Joy Buolamwini, who led the study, wrote about how biased AI can have 'serious consequences' such as those pictured, including illegal discrimination in hiring, firing and housing, as well as other impacts on social and economic situations

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